



Long-Life Catalyst

Commercial Benefits—Spinoffs

Finding out which way the wind blows has stimulated development of a catalyst capable of converting toxic carbon monoxide to a nontoxic gas.

Langley Research Center scientists have developed low-temperature carbon monoxide oxidation catalysts. The requirement for these catalysts was driven by the need for recycling carbon monoxide and converting it back to carbon dioxide during the operation of closed-cycle carbon dioxide lasers in space environments. These catalysts were developed for a long-life, highly power-pulsed carbon dioxide laser, to be incorporated in a Laser Atmospheric Wind Sounder (LAWS) satellite. The catalysts were used to measure wind velocity on a worldwide basis.

The problem faced by space engineers and scientists was that the electrical discharges that energize such lasers generally decompose some of the carbon dioxide to carbon monoxide, resulting in a loss of laser power. The most practical solution to the problem is regeneration by catalytic recombination. To minimize energy consumption, recombination should be done at ambient laser temperatures with no addition of energy to the catalyst or laser. What was needed was a catalyst that met these properties, along with the ability to remove carbon monoxide and formaldehyde from the air in enclosed spaces.

Scientists and engineers at STC Catalysts, Inc. (SCI), of Hampton, Virginia, supported the Langley development of the catalyst, and are co-inventors on the patents. The firm has an exclusive license from Langley to manufacture carbon monoxide oxidation catalysts for use in carbon dioxide laser applications. The catalyst permits the closed cycle operation of a laser for billions of pulses without replenishing the operating gases. Also, the catalyst prolongs laser life, reduces power output fluctuations, and can be customized to fit any laser.

SCI, a subsidiary of the STC Group, Inc., manufactures the noble metal reducible oxide catalyst, consisting primarily of platinum and tin oxide deposited on a ceramic substrate. It is an ambient temperature oxidation catalyst that was developed primarily for use in carbon dioxide lasers.

SCI has an exclusive license to manufacture and distribute the catalyst for all laser applications. The firm is also furnishing the catalyst for other applications through additional agreements with NASA and with the Rochester Gas and Electric Company in Rochester, New York, who holds a license for

controlling air quality in inhabited spaces.

Energy conservation and indoor air quality are important but often conflicting priorities for gas and electric utilities and their consumers. One widely used method of conserving energy is to reduce the exchange of indoor and outdoor air by tightly sealing buildings. But such construction can result in the significant buildup of contaminant gases, requiring efficient methods of removal.

Carbon monoxide buildup, in particular, is dangerous in inhabited spaces. In some instances, it can be released in lethal doses by faulty furnaces or poorly ventilated fireplaces. While carbon monoxide alarms have been developed, a preferable solution is to remove carbon monoxide continuously and rapidly.

Now, thanks to the room temperature catalyst, toxic gas can be oxidized to nontoxic carbon dioxide when placed in air-conditioning systems. An additional benefit of the catalyst is that it also removes formaldehyde from air by oxidizing it to carbon dioxide and water. ❖



STC Catalysts, Inc.'s catalyst has the ability to remove carbon monoxide and formaldehyde from the air in enclosed spaces.